UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR RELIEF FROM ASME CODE REPAIR REQUIREMENTS

FOR ASME CODE CLASS 3 PIPING

STP NUCLEAR OPERATING COMPANY

SOUTH TEXAS PROJECT, UNIT 2

DOCKET NO.: 50-499

1.0 INTRODUCTION

10 CFR 50.55a(g) requires nuclear power facility piping and components to meet the applicable requirements of Section XI of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (hereafter referred to as the Code). Section XI of the Code specifies Code-acceptable repair methods for flaws that exceed Code acceptance limits in piping that is in-service. A Code repair is required to restore the structural integrity of flawed Code piping, independent of the operational mode of the plant when the flaw is detected. Those repairs not in compliance with Section XI of the Code are non-Code repairs. However, the implementation of required Code (weld) repairs to ASME Code Class 1, 2 or 3 systems is often impractical for nuclear licensees since the repairs normally require an isolation of the system requiring the repair, and often a shutdown of the nuclear power plant.

Alternatives to Code requirements may be used by nuclear licensees when authorized by the Commission if the proposed alternatives to the requirements are such that they are shown to provide an acceptable level of quality and safety in lieu of the Code requirements [10 CFR 50.55a(a)(3)(i)], or if compliance with the Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety [10 CFR 50.55a(a)(3)(ii)].

A licensee may also submit requests for relief from certain Code requirements when a licensee has determined that conformance with certain Code requirements is impractical for its facility [10 CFR 50.55a(g)(5)(iii)]. Pursuant to 10 CFR 50.55a(g)(6)(i), the Commission will evaluate determinations of impracticality and may grant relief and may impose alternative requirements as it determines is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

Generic Letter (GL) 90-05, entitled "Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2 and 3 Piping," and dated June 15, 1990, provides guidance for the staff in evaluating relief requests submitted by licensees for temporary non-Code repairs of Code Class 3 piping. For the purpose of this generic letter, impracticality is defined to exist if the flaw detected during plant operation is in a section of Class 3 piping that cannot be isolated for

completing a Code repair within the time period permitted by the limiting condition for operation of the affected system as specified in the plant technical specifications and performance of Code repair necessitates a plant shutdown.

2.0 BACKGROUND

During plant operation, the licensee discovered a small discolored area on the exterior of a 10-inch by 10-inch by 10-inch cast pipe tee located in the Unit 2 Mechanical Auxiliary Building. The tee is located just upstream of 2-EW-2065 Train 2A and Train 2B Chiller Supply Cross-Tie Isolation Valve. The cast pipe tee is a part of the Essential Cooling Water System (ECWS) at the South Texas Project. The ECWS is a low pressure system with normal operating pressures of approximately 50 psig and the design pressure is 120 psig. The cast pipe tee material was identified to be cast aluminum-bronze (ASME SB 148 CA952 material). The discoloration was removed with wire brush but returned within a few months after cleaning which indicated that dealloying is taking place in the aluminum-bronze cast fitting. By letter dated April 8, 1998, the licensee requested relief from the ASME Code, Section XI repair or replacement requirements under the provisions of 10 CFR 50.55a(g). The licensee based its request for relief on the results of a flaw evaluation that was performed by the licensee in accordance with the guidelines and acceptance criteria contained in GL 90-05.

3.0 LICENSEE'S RELIEF REQUEST

3.1 Components for Which Relief is Requested

ASME Code Class 3 essential cooling water system piping (one 10-inch by 10-inch by 10-inch cast pipe tee).

3.2 Section XI Edition for South Texas Project, Unit 2

1983 Edition including Summer 1983 Addenda of the ASME Code, Section XI.

3.3 ASME Section XI Code Requirement

The ASME Code Section XI requires that repairs or replacements of ASME Code Class components be performed in accordance with rules found in Articles IWA-4000 or IWA-7000, respectively. These rules serve to provide an acceptable means of restoring the structural integrity of a degraded Code Class system back to the original design requirements.

3.4 Content of the Relief Request

Relief is sought from performing a repair or replacement of one 10-inch by 10-inch by 10-inch cast pipe tee (Unit 2, train 2-EW-2065, weld # FW-4282) per the requirements of Article IWA-4000 or IWA-7000, respectively. Relief is being sought until the next South Texas, Unit 2 refueling outage which was scheduled to take place in October of 1998.

3.5 Basis for Relief

The licensee has evaluated the flaw in accordance with the guidance provided in GL 90-05. Based upon the evaluation, the licensee established that the discovered flaw satisfies the criteria for non-code repair as described in GL 90-05 and performing permanent repair in accordance with the ASME Code prior to an extended allowable outage time or refueling outage as permitted by the limiting condition for operation may not be practicable due to the potential for fit-up problems during repair. Further, the licensee determined that the dealloying degradation of the piping is a slow process and rapid or catastrophic failure is not a consideration. In addition, the ECWS is a low pressure system with normal operating pressure of approximately 50 psig and therefore severe failure consequences associated with high energy lines are not applicable for the ECWS.

3.6 Licensee's Alternative Program

1. Weekly monitoring for qualitative assessment of leakage (quantitative if measurable leaks are observed). The licensee stated that there was no leakage or surface accumulation of moisture at this location.

2. Continuation of ECWS large bore piping periodic walkdowns. This walkdown is regularly scheduled VT-2 examination. The licensee stated that this inspection technique has proven to be an effective means of identifying dealloyed/cracked components prior to deterioration of structural integrity margins below ASME XI requirements.

4.0 STAFF EVALUATION AND CONCLUSIONS

4.1 Operability Determination, Root Cause Analysis and Structural Integrity Evaluation

The licensee determined that the flaw was located in the ECWS which is classified as ASME Code Class 3 system. The flaw was located in Unit 2, 10-inch by 10-inch by 10-inch cast pipe tee. The flawed pipe material was identified to be cast aluminum-bronze which is inherently ductile material (ASME SB 148 CA952 material). Upon discovery of the flaw, the licensee performed volumetric ultrasonic examination of the affected area. The examination revealed no linear indications or cracking. An evaluation of the flaw using the guidance provided in GL 90-05 was performed and found that the flaw satisfies the through-wall criteria prescribed in GL 90-05 and that the flaw meets the criteria for a non-Code repair. The licensee determined that the operability of the system will not be impaired because there was no leak, and any leakage would be detected before the flaw reaches a limiting size that would affect the operability of the ECWS.

The licensee performed a root cause analysis of the flaw, and determined that the degradation resulted from dealloying. The licensee stated that the dealloying process normally initiates from a crevice such as the area behind a backing ring, fabrication-induced flaw, or a casting flaw. Ultrasonic examination of the Unit 2, 10-inch by 10-inch by 10-inch tee found no linear indications or cracks. The limited extent of discoloration indicated that the degree of dealloying is relatively minor. The problem of dealloying of castings has also been described in previous communications with the NRC.

4.2 Augmented Inspection

The flaw was located in a 10-inch by 10-inch by 10-inch cast tee. The flaw was visually and ultrasonically examined to assess the flaw. Augmented weekly inspections were performed and are designed to enhance the detection of even minor changes in the external expression of through-wall dealloying whether it is the quantitative measurement of leakage or the size of the area of discoloration.

4.3 Temporary Noncode Repair and Monitoring Provisions

The licensee monitored the flawed area weekly for qualitative assessment of leakage. In addition, the licensee performed its ECWS large bore piping periodic walkdowns. If a significant change was found as a result of the monitoring, the licensee would have performed a reevaluation of the structural integrity and the monitoring frequency. In the April 8, 1998, letter, the licensee stated that the flaw will be repaired during but no later than the next scheduled Unit 2 outage (October of 1998).

By letter dated December 14, 1998, the licensee stated that repair of the ECWS tee was completed on August 19, 1998 and that the repair meets ASME Section XI code requirements. During a phone call with the licensee on January 21, 1999, the staff asked the licensee how they were able to perform the repair prior to the Unit 2 refueling outage, which began on October 3, 1998. The licensee explained that at the time the flaw was discovered, it was not possible to perform the repair within the time allowed by the limiting condition for operation because the time needed to perform the repair included preparation time and installation time. Preparation time includes purchase and/or fabrication of replacement parts. When the licensee had completed the preparatory work and found an opportunity to perform the installation within the time allowed by the limiting condition for operation, the licensee decided to perform the repair prior to the Unit 2 refueling outage. The staff finds that the licensee's explanation is consistent with its April 8, 1998, letter. The staff also discussed a typographical error in the licensee's December 14, 1998, submittal. In the third paragraph of that submittal the licensee inadvertently used the word flange instead of tee.

4.4 Staff Conclusions

The staff has determined that the licensee's flaw evaluation has been consistent with the guidelines and acceptance criteria of GL 90-05. The staff, therefore, finds the licensees' structural integrity and operability assessments to be acceptable. The licensee monitored the flawed area weekly for qualitative assessment of leakage. In addition, the licensee continued its ECWS large bore piping periodic walkdowns until the code repair was performed in August 1998. The licensee's actions constituted an acceptable temporary alternative to the Code requirements. Furthermore, the staff finds that performance of an immediate Code repair would have resulted in hardship or unusual difficultly without a compensating increase in the level of quality and safety since the repair may not have been completed within the time period permitted by the limiting condition for operation and thus an isolation of the affected ECWS piping would have been required. Such an isolation is not in the best interest of plant safety, given the magnitude of the flaw and the reasonable assurance provided by the licensee's alternative program. Further, the licensee determined that the leakage can be detected before the flaw reaches a limiting size that would affect the operability of the ECWS (there was no leakage and a code repair was completed in August 1998).

The staff, therefore concludes that the licensee's proposed alternatives to the Code requirements are authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

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